Home work #8	Ch 7: 7.2-7.4	Wed, 02/09/04

Ch. 7

Q14:

No, $p = mv$ and the velocity, v, will increase with time under the influence of the force of gravity. Hence momentum, p, will increases too.

Q15:

No, only the total moment of both these objects is conserved. Each object will change its velocity changing the momentum.

Q19:

The total momentum of the system will be equal to zero because both skaters will have an equal and opposite momentum.

Q27:

Because the ball did not stick with a wall but its velocity after a collision is less than before, this collision is mostly elastic.

E11:

a) The total momentum of the system will be zero because both skaters will have an equal and the opposite momentum.

b) $p = mv$, $m_s v_s = - m_l v_l$, hence $v_s = -(m_l v_l)/m_s$ = - [(80 kg) (3m/s)]/32 kg =
= - 7.5 m/s

E12:

a) $p_b = m_b v_b$ = (0.005 kg)(600 m/s) = 3 kg·m/s

b) $m_b v_b = - m_r v_r$, $v_r = -(m_b v_b)/m_r = - p_b/m_r$ = - (3 kg·m/s)/2.2 kg =

= - 1.36 m/s

E14:

a) $p_1 = m_1 v_1 = (12\ 000\ kg)(12\ m/s)$ = 144 000 kg·m/s

b) $v_{1+2} = p_b/m_{1+2}$ = (144 000 kg·m/s)/(12 000 kg +18 000 kg) =

= (144 000 kg·m/s)/(30 000 kg) = 4.8 m/s

CP5:

a) $p_{1+2} = m_1 v_1 + (- m_2 v_2) = m_1 v_1 - m_2 v_2 =$

$= (1500\ kg)(25\ m/s) – (4500\ kg)(15\ m/s) =$

= 37 500 kg·m/s – 67 500 kg·m/s = - 30 000 kg·m/s (due south)

b) $v_{1+2} = p_b/m_{1+2}$ = (30 000 kg·m/s)/(6 000 kg) = - 5 m/s (due south)

c) $KE_1 = ½\ m_1 v_1^2$ = ½ (1500 kg) (25 m/s)^2 = 468 750 J

$KE_2 = ½\ m_2 v_2^2$ = ½ (4500 kg) (15 m/s)^2 = 506 250 J

KE_{1+2} = 468 750 J + 506 250 J = 975 000 J or 975 kJ

d) $KE = ½\ mv^2$ = ½ (6 000 kg) (5 m/s)^2 = 75 000 J or 75 kJ

e) No, the collision was not elastic because the objects stick together after the collision and the kinetic energy before and after the collision is not the same.